



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants:	Mark Cullen) Confirmation No. 6075
Serial No.:	10/644,255) Art Unit: 1764
Filed:	August 20, 2003) Examiner: Tam M. Nguyen
For:	Treatment of Crude Oil Fractions, Fossil Fuels & Products Thereof)

APPEAL BRIEF UNDER 37 C.F.R. § 41.37

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Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir/Madam:

Previously, a Notice of Appeal under 37 C.F.R. § 41.31 was filed on March 29, 2006. Thereafter, an Appeal Brief under 37 C.F.R. § 41.37 was submitted with the requisite fee under 37 C.F.R. § 41.20(b)(2) in the amount of \$250.00 on May 25, 2006. In view of Applicant's Appeal Brief, the Examiner sought to reopen prosecution and subsequently rejected Claims 40-88 as set forth in the non-final Office Action of August 8, 2006, which was again sent on September 8, 2006 with the requisite signature of a Supervisory Patent Examiner, per M.P.E.P. §1207.04.

In response, Appellant has chosen to initiate a new appeal and, pursuant thereto, is filing a second Notice of Appeal under 37 C.F.R. § 41.31 concurrently herewith. Pursuant to M.P.E.P. § 1207.04, no additional fee is believed to be required.

Application No.: 10/644,255
Attorney Docket: CULLN-001B

If for any reason any additional fee is necessary, the Commissioner is authorized to charge the appropriate fee for the Appeal Brief and/or any necessary extension of time fees to Deposit Account Number 19-4330.

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I. REAL PARTY IN INTEREST

The real party in interest is Petrosonics, LLC by assignment recorded in the U.S. Patent and Trademark Office on April 18, 2006 at Reel 017486, Frame 0704.

II. RELATED APPEALS AND INTERFERENCES

Appeals are pending on United States Patent Application Numbers 10/411,796 and 10/429,369, which have the same Applicant, are owned by the same Assignee, and are directed toward similar subject matter. Also, a complaint has been filed by SULPHCO, INC., a Nevada corporation, against MARK CULLEN, the inventor of the here-appealed application. The complaint, assigned Case No. CV06-01490, was filed on June 26, 2006, in the Second Judicial District Court of the State of Nevada in and for the County of Washoe and concerns the ownership of the here-appealed application.

III. STATUS OF CLAIMS

Claims 40-88 stand rejected pursuant to the reopening of prosecution as set forth in the non-final Office Action dated August 8, 2006, which was again issued on September 5, 2006 with the requisite signature of a Supervisory Patent Examiner, per M.P.E.P. §1207.04. Claims 40-88 are hereby being appealed.

IV. STATUS OF AMENDMENTS

Appellant's Amendment filed on March 20, 2006, after the final rejection, was entered by the Examiner prior to the first appeal.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The independent claims of the present application relate to processes for upgrading a crude oil fraction to improve the performance and enhance the utility of the crude oil fraction, wherein the upgrade is effected by heating the crude oil fraction while simultaneously exposing it to sonic energy in specific types of reaction mediums. *See specification p. 9, lines 5-11; specification p. 5, lines 15-19.* More particularly, the process claimed in independent Claim 40 includes the presence of an oxidizing agent and the absence of an aqueous phase. *See specification p. 5, lines 15-19; specification p. 10, line 31 through p. 11, line 2.* The process claimed in independent Claim 58 includes the presence of an oxidizing agent and the absence of a surface active agent. *See specification p. 5, lines 15-19; specification p. 11, lines 16-17.* The process claimed in independent Claim 76 includes the absence of an oxidizing agent. *See, e.g., specification p. 6, lines 19-23.*

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

- A. Whether Claims 40-88 are improperly rejected under 35 U.S.C. § 112, first paragraph, for not being enabled by the specification;
- B. Whether Claims 40-48 are improperly rejected under 35 U.S.C. § 112, first paragraph, for being based on a disclosure which is not enabling;
- C. Whether Claims 41 and 48-51 are improperly rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Appellant regards as the invention;

- D. Whether Claims 40 and 41 are improperly rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over Claims 1 and 4 of copending Application No. 10/429,369;
- E. Whether Claims 40 and 41 are improperly rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over Claims 1, 4, 12, and 14 of copending Application No. 10/411,796;
- F. Whether Claims 40-46 are improperly rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over Claims 35-39 of copending Application No. 10/431,666;
- G. Whether Claims 40-57 are improperly rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,500,219 to Gunnerman (hereinafter “Gunnerman”);
- H. Whether Claims 58-75 are improperly rejected under 35 U.S.C. § 103(a) as being unpatentable over Gunnerman;
- I. Whether Claims 78-88 are improperly rejected under 35 U.S.C. § 103(a) as being unpatentable over Gunnerman;
- J. Whether Claims 76 and 83-88 are improperly rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 3,616,375 to Inoue (hereinafter “Inoue”);
- K. Whether Claims 77-81 are improperly rejected under 35 U.S.C. § 103(a) as being unpatentable over Inoue in view of Gunnerman; and
- L. Whether Claim 82 is improperly rejected under 35 U.S.C. § 103(a) as being unpatentable over Inoue alone or in view of Gunnerman.

ARGUMENT

A. The rejection of Claims 40-88 under 35 U.S.C. § 112, first paragraph, for not being enabled by the specification is in error, the rejection should be reversed, and the subject application should be remanded to the Examiner with instructions to allow Claims 40-88.

i. *The Examiner's Rejection of Claims 40-88*

The Examiner submits in the Office Actions of August 8, 2006/September 8, 2006 that Claims 40-88, which are directed toward upgrading a crude oil fraction, are not enabled by the specification. *See p. 2.* The Examiner admits that the specification is enabling for sulfur and nitrogen removal from crude oil. *See Office Action p. 2.* However, the Examiner declares that upgrading crude oil would include “alkylation, isomerization, hydrogenation, dehydrogenation, dimerization, or cracking,” all of which the Examiner contends are not enabled by the specification. *See Office Action pp. 2-3.* The Examiner therefore concludes that undue experimentation would be required to determine how the claimed process would be effective to upgrade crude oil. *See Office Action p. 3.*

ii. *Appellant's Claims 40-88*

Appellant's claims are directed toward processes for upgrading a crude oil fraction to improve the performance and enhance the utility of the crude oil fraction. Such limitations are fully and clearly described in the specification.

a. *Appellant's claims directed toward upgrading crude oil are fully enabled by the specification and allow a person skilled in the art to use the invention as claimed without requiring undue experimentation*

In order to determine whether a claim is enabled, the disclosure must contain sufficient information regarding the subject matter of the claims as to enable one skilled in the pertinent art to make and use the claimed invention. *See M.P.E.P. § 2164.01*. It is well settled law that the test to be used is whether the claimed invention is sufficiently enabled so that any person skilled in the art can make and use the invention without undue experimentation. *In re Wands*, 858 F.2d 731, 737, 8 U.S.P.Q.2d 1400, 1404 (Fed. Cir. 1988); *See also M.P.E.P. § 2164.01*. In this regard, "...the only relevant concern should be whether the scope of enablement provided to one skilled in the art by the disclosure is commensurate with the scope of protection sought by the claims." *M.P.E.P. § 2164.08* (emphasis added). In determining this scope, "one does not look to the claims but to the specification to find out how to practice the claimed invention." *Id.*

Furthermore, the examiner has the initial burden of establishing a reasonable basis to question the enablement provided for the claimed invention. *In re Wright*, 999 F.2d 1557, 1562, 27 U.S.P.Q.2d 1510, 1513 (Fed. Cir. 1993); *See also M.P.E.P. § 2164.04*. In regard to this burden, a specification disclosure which contains a teaching of the manner and process of making and using an invention in terms which correspond in scope to those used in describing and defining the subject matter sought to be patented must be taken as being in compliance with the enablement requirement of 35 U.S.C. § 112, first paragraph, unless

there is reason to doubt the objective truth of the statements contained therein which must be relied on for enabling support. *M.P.E.P. § 2164.04.*

In the present case, it is unmistakable that the enablement requirement has been met. The specification disclosure is clearly replete with information directed toward the fuel upgrade process and fully enables a person skilled in the art to use the claimed processes in order to upgrade a crude oil fraction, as defined by the Applicant. One skilled in the art would clearly be able to practice the claimed invention after reading the disclosure. In particular, the disclosure recites, *inter alia*, the preferred temperatures of the reaction (Paragraph 0037); the preferred frequency of the sonic waves (Paragraph 0038); the preferred displacement amplitude and power density of the sonic energy (Paragraph 0040); and the preferred reaction time (Paragraph 0041). As such, one skilled in the art would be able to practice the claimed invention in order to upgrade a crude oil fraction, as defined by the Applicant, without the need for undue experimentation, thereby meeting the *Wands* test.

Indeed, even to maintain this rejection the Examiner applied his own definition for “upgrading” a crude oil fraction without providing any evidence of the reasonableness of that definition. It is well known that, “the words of the claim must be given their plain meaning unless applicant has provided a clear definition in the specification.” *M.P.E.P. § 2111.01.* Furthermore, this plain meaning, “...is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention,” and, “may be evidenced by a variety of sources including: the claims themselves; dictionaries and treatises; and the written description, the drawings, and the prosecution history.” *Id.*

Notwithstanding the presumption that the words of a claim are given their plain meaning, an applicant is free to define words as he or she sees fit by being his or her own

lexicographer, and this definition will control interpretation of the term as used in the claim whether such definition is explicitly stated by the applicant or even is implicitly defined by usage of the term in context in the specification. *Id.* It is clear that the Examiner submitted his own definition of “upgrading” a crude oil fraction; what is not so clear is how the Examiner arrived at this definition. First, the Examiner has not shown why his submitted definition would be the ordinary and customary meaning of upgrading a crude oil fraction because he did not point to anywhere in Applicant’s specification that defines upgrading in such a manner, nor did the Examiner provide any references to dictionaries or treatises which define upgrading in such a manner. Second, even if the Examiner’s definition were to be construed as the ordinary and customary meaning of upgrading a crude oil fraction, which Applicant does not concede, that definition would be moot since Applicant acted as his own lexicographer throughout the application and provided his own definition of “upgrading” a crude oil fraction.

In this regard, to show Applicant’s definition of “upgrading” a crude oil fraction there is provided herebelow a mere sampling of the many such references to be found in the specification.

- Paragraph 0003 (...this invention addresses reformation processes as ring-opening reactions and the saturation of double bonds, to upgrade fossil fuels and convert organic products to forms that will improve their performance and expand their utility.);
- Paragraph 0014 (It has now been discovered that fossil fuels, crude oil fractions, and many of the components that are derived from these sources can

undergo a variety of beneficial conversions and be upgraded in a variety of ways by a process that ...);

- Paragraph 0015 (Included among the conversions achieved by the present invention are ... the saturation of double bonds and aromatic rings, and the opening of rings in fused-ring structures converting aromatics to cycloparaffins ... monocyclic aromatics to noncyclic structures ... converting olefins to paraffins, and in processes for breaking carbon-carbon bonds ...);
- Paragraph 0016 (...API gravities of fossil fuels and crude oil fractions are raised (i.e., the densities lowered) as a result of treatments in accordance with the invention.);
- Paragraph 0017 (...the invention raises the cetane index of petroleum fractions and cracking products...The invention also imparts other beneficial changes such as a lowering of boiling points...);
- Paragraph 0019 (By virtue of the conversions that occur as a result of the process of this invention, hydrocarbon streams experience changes in their cold flow properties, including their pour points, cloud points, and freezing points.);
- Paragraph 0021 (The present invention is useful in the treatment of any of these fuels and fuel oils for purposes of...general upgrading to improve performance and enhance utility.);
- Paragraph 0025 (Fossil fuels and crude oil fractions treated in accordance with this invention have significantly improved properties relative to the same

materials prior to treatment, these improvements rendering the products unique and improving their usefulness as fuels.);

- Paragraph 0026 (Another of these properties improved via the present invention is the API gravity.); and
- Paragraph 0028 (...fossil fuels boiling within the diesel range that are treated in accordance with this invention experience an improvement in their cetane index...).

Since such a large portion of the specification is drawn toward the fuel upgrading qualities achieved through the processes of the present invention, as shown by the sampling above, it is unfathomable how the Examiner could contend that the specification does not enable the claims directed toward fuel upgrading.

Additionally, the Examiner has not met his burden of showing a reasonable basis to question the enablement. The specification fully discloses how the claimed invention may be used to upgrade fuel, as defined by the Applicant, and the Examiner has not presented any evidence to doubt the truth of the statements contained therein, nor why his definition of fuel upgrading should be used as opposed to the Applicant's definition as recited throughout the entire specification.

Furthermore, although the Examiner has chosen to repeat his arguments for justifying the §§ 102 and 103 rejections verbatim from the Office Action of March 14, 2006, the Examiner did not raise any § 112 issues in that previous Office Action. This fact is particularly relevant as the principles of compact prosecution dictate that if an enablement rejection is appropriate, the first Office Action should present the issue with all of the relevant reasons, issues, and evidence for such a rejection. *See M.P.E.P. § 2164.04.* As such

the addition of § 112 rejections in an Office Action due to reopening prosecution after the filing of an appeal brief goes directly against the doctrine of compact prosecution and clearly favors Appellant's argument that the § 112, first paragraph, rejection is untenable.

For the reasons stated above, the Board must reverse the rejection of Claims 40-88 under 35 U.S.C. § 112, first paragraph, and remand the subject application to the Examiner with instructions to allow such claims.

B. The rejection of Claims 40-48 under 35 U.S.C. § 112, first paragraph, for being based on a disclosure which is not enabling is in error, the rejection should be reversed, and the subject application should be remanded to the Examiner with instructions to allow Claims 40-48.

i. *The Examiner's Rejection of Claims 40-48*

The Examiner submits in the Office Actions of August 8, 2006/September 8, 2006 that Claims 40-48 are based on a disclosure which is not enabling. *See p.3.* The Examiner contends that a phase-separation step is critical or essential to the invention, but not included in the claims. *See Office Action p.3.* Finally, the Examiner contends that contaminants such as sulfur compounds would not be removed from the crude oil if a heavier layer comprising the sulfur compounds is not separated from the crude oil. *See Office Action p.3.*

ii. *Appellant's Claims 40-48*

Appellant's claims are directed toward *a process for upgrading a crude oil fraction* to improve the performance and enhance the utility of the crude oil fraction. Such a process is fully enabled by the specification.

- a. *Appellant's claims are fully enabled because they are directed toward upgrading a crude oil fraction, not toward phase-separation or sulfur removal*

The Examiner appears to be confused as to the subject matter of the presently claimed invention. The Examiner is treating these claims as if they were directed toward sulfur removal. Although sulfur removal is one aspect of Appellant's disclosure, it is certainly not the only aspect of Appellant's disclosure; more importantly, it is not the aspect of Appellant's disclosure that is recited in Claims 40-48. These claims are directed toward upgrading a crude oil fraction. Such upgrading process is fully enabled by the specification, as was discussed above, and does not require a phase-separation step nor the removal of contaminants via a separation of layers. Appellant's Application discloses that *the addition of an aqueous phase to the fossil fuel is optional* and further that the aqueous phase may make up 0% of the combined organic and aqueous phases. *See Paragraph 0030.*

It is well known that, "...an enablement rejection based on the grounds that a disclosed critical limitation is missing from a claim should be made *only when the language of the specification makes it clear that the limitation is critical for the invention to function as intended.*" M.P.E.P. § 2164.08(c) (emphasis added). In the present situation, Applicant's disclosure makes it clear that the presence of an aqueous phase is optional, and *not critical* to

the practice of the invention. Furthermore, every additional aspect necessary for one skilled in the art to practice the processes of the present invention, such as temperature parameters, frequency and intensity of the sonic energy applied, the exposure time of the reaction medium to the sonic energy, and the like are likewise clearly set forth in the specification. *See, e.g., Paragraphs 0037-0041.* As such, the Examiner's contention that the phase-separation step is essential to the practice of the invention is incorrect.

Accordingly, the rejection under 35 U.S.C. § 112, first paragraph, for failing to include a phase-separation step is improper. As such, the Board must reverse the rejection of Claims 40-48, and remand the subject application to the Examiner with instructions to allow such claims.

C. The rejection of Claims 41 and 48-51 under 35 U.S.C. § 112, second paragraph, as being indefinite is in error, the rejection should be reversed, and the subject application should be remanded to the Examiner with instructions to allow Claims 41 and 48-51.

i. *The Examiner's Rejection of Claims 41 and 48-51*

The Examiner contends in the Office Actions of August 8, 2006/September 8, 2006 that Claims 41 and 48-51 are indefinite because the addition of hydrogen peroxide into the crude oil would result in an aqueous phase while the subject claims are limited to in the absence of an aqueous phase.

ii. *Appellant's Claims 41 and 48-51*

Appellant's Claim 41, and Claims 48-51 which are dependent on Claim 41, limits the oxidizing agent to "hydrogen peroxide or a hydroperoxide."

a. ***Appellant's claims are definite because a person skilled in the art would understand what is claimed***

As is well known, definiteness under 35 U.S.C. § 112, second paragraph, is determined by whether "those skilled in the art would understand what is claimed when the claim is read in light of the specification." *Orthokinetics, Inc. v. Safety Travel Chairs, Inc.*, 806 F.2d 1565, 1576, 1 U.S.P.Q.2d 1081, 1088 (Fed. Cir. 1986); *See also M.P.E.P. § 2173.02*. Additionally, when the language is as precise as the subject matter permits, the case law has stated that 35 U.S.C. § 112, second paragraph, only requires that the claims, when read in light of the specification, reasonably apprise those skilled in the art both of the utilization and scope of the invention. *See Shatterproof Glass Corp. v. Libbey Owens Ford Co.*, 758 F.2d 613, 225 U.S.P.Q. 634 (Fed. Cir. 1985); *See also M.P.E.P. § 2173.05(a)*.

Appellant's Claims 41 and 48-51 require the presence of a hydroperoxide, one of which may be hydrogen peroxide. Appellant's specification defines hydrogen peroxide as having the chemical formula H-O-O-H. *See Paragraph 0030*. Although hydrogen peroxide is traditionally present in an aqueous solution, in no case does Appellant's specification require that the hydrogen peroxide be in an aqueous solution.

Furthermore, a person skilled in the art would understand the limitation of "in the absence of an aqueous phase" to allow for the addition of a reagent, such as hydrogen peroxide, in an aqueous carrier that creates at most a negligible aqueous phase. This is

especially true since Appellant's specification states that the hydrogen peroxide, if present at all, can be present in an amount as low as 0.0003% by volume. Therefore, a person having skill in the art would not understand this small addition of hydrogen peroxide to destroy the claim limitation of "in the absence of an aqueous phase," especially when read in light of Appellant's specification.

For the reasons stated above, the Board must reverse the rejection of Claims 41 and 48-51 under 35 U.S.C. § 112, second paragraph, and remand the subject application to the Examiner with instructions to allow such claims.

D. The rejection of Claims 40 and 41 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over copending Application No. 10/429,369 is clearly in error, the rejection should be reversed, and the subject application should be remanded to the Examiner with instructions to allow Claims 40 and 41.

i. A Terminal Disclaimer Has Already Been Filed

A Terminal Disclaimer with regard to copending Application No. 10/429,369 was filed with the United States Patent and Trademark Office on March 20, 2006 and approved on March 23, 2006. As such, this rejection is untenable since the double patenting rejecting is moot.

Accordingly, the rejection of Claims 40 and 41 must be reversed and the subject application remanded to the Examiner with instructions to allow Claims 40 and 41.

E. The rejection of Claims 40 and 41 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over copending Application No. 10/411,796 is clearly in error, the rejection should be reversed, and the subject application should be remanded to the Examiner with instructions to allow Claims 40 and 41.

i. *A Terminal Disclaimer Has Already Been Filed*

A Terminal Disclaimer with regard to copending Application No. 10/411,796 was filed with the United States Patent and Trademark Office on March 20, 2006 and approved on March 23, 2006. As such, this rejection is untenable since the double patenting rejecting is moot.

Accordingly, the rejection of Claims 40 and 41 must be reversed and the subject application remanded to the Examiner with instructions to allow Claims 40 and 41.

F. The rejection of Claims 40-46 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over copending Application No. 10/431,666 is clearly in error, the rejection should be reversed, and the subject application should be remanded to the Examiner with instructions to allow Claims 40-46.

i. *A Terminal Disclaimer Has Already Been Filed*

A Terminal Disclaimer with regard to copending Application No. 10/431,666 was filed with the United States Patent and Trademark Office on March 20, 2006 and approved

on March 23, 2006. As such, this rejection is untenable since the double patenting rejecting is moot.

Accordingly, the rejection of Claims 40-46 must be reversed and the subject application remanded to the Examiner with instructions to allow Claims 40-46.

G. The rejection of Claims 40-57 under 35 U.S.C. § 103(a) as being unpatentable over Gunnerman is in error, the rejection should be reversed, and the subject application should be remanded to the Examiner with instructions to allow Claims 40-57.

i. *The Examiner's Rejection of Independent Claim 40*

The Examiner submits in the verbatim Office Actions of August 8, 2006 and September 8, 2006 that Gunnerman discloses a process for removing sulfur from a hydrocarbon feed by preheating the feed and contacting it with an oxidizing agent while exposing the feed to sonic energy and a nickel or tungsten catalyst at a residence time of from about 0.3 minutes to about 30 minutes at a temperature of from 70°C to 80°C at about atmospheric pressure. *See col. 3, lines 18-45; col. 4, lines 38-47; col. 5, line 23 through col. 6, line 37; example 1.*

However, *the Examiner concedes that Gunnerman does not disclose that the process is operated in the absence of an aqueous phase.* *See Office Action p. 6.* To satisfy this feature, the Examiner submits that at the time the invention was made it *would have been obvious* to one having ordinary skill in the art to have modified the Gunnerman process by

operating the process in the absence of an aqueous phase if the function of the aqueous phase is undesirable. *See Office Action p. 6.*

ii. A Review of Gunnerman

Gunnerman provides a method for reducing the sulfur content of a fossil fuel by applying ultrasound to a multiphase reaction medium containing the fossil fuel along with an aqueous fluid, a hydroperoxide oxidizing agent, and a surface active agent. *See col. 2, lines 26-30.* After receiving the ultrasound treatment, the reaction medium spontaneously separates into an organic phase, the latter now containing the desulfurized fossil fuel, and a separate aqueous phase, now containing the sulfur compounds. *See col. 2, lines 31-43.*

iii. Appellant's Independent Claim 40

Appellant's independent Claim 40 recites, *inter alia*, a process for *upgrading* a crude oil fraction to *improve the performance and enhance the utility* of the crude oil fraction, said process comprising...exposing said crude oil fraction to sonic energy *in the absence of an aqueous phase*. The aforementioned features recited in independent Claim 40 *are not taught or suggested by Gunnerman.*

a. *There is no evidence supporting the motivation to modify the Gunnerman reference to be practiced without the use of an aqueous phase*

Gunnerman requires the presence of an aqueous phase because the Gunnerman process effectuates the removal of sulfur by allowing the aqueous and organic phases to

separate after a sonic energy treatment, wherein the *aqueous phase ultimately contains the sulfur products.* See col. 2, lines 26-44. An aqueous phase is *essential* to Gunnerman because it is the means by which the oxidized sulfur is extracted from the fossil fuel. See col. 3, lines 1-5.

The Examiner concedes in the Office Action that Gunnerman *does not disclose an operation in the absence of an aqueous phase.* See p. 6. As is well known, references can be modified for purposes of a Section 103 rejection *only if there is some suggestion or incentive to do so.* *In re Fritch*, 23 U.S.P.Q.2d 1780, 1783 (Fed. Cir. 1992); *M.P.E.P.* § 2143.01. Thus, some motivation would need to be shown in order to so drastically modify the Gunnerman process as to remove the essential element of having an aqueous phase because, “impermissible hindsight must be avoided and the [conclusion of obviousness] must be reached on the basis of the facts gleaned from the prior art.” *In re Zurko*, 59 U.S.P.Q.2d 1693, 1697 (Fed. Cir. 2001); *See also M.P.E.P.* § 2142. The Examiner failed to identify any teaching in the prior art or any evidence of the knowledge of one of ordinary skill in the art that would lead to this improper modification of Gunnerman. Since no evidence has been provided, the Examiner has not met his burden of establishing a *prima facie* case of obviousness.

b. *The case law cited by the Examiner does not provide the missing motivation to modify the Gunnerman reference*

In the Office Action, the Examiner relies on three cases to provide support for his improper finding of obviousness. These three cases are easily distinguishable from the present matter. In *Ex parte Wu*, the Board affirmed the Examiner’s finding that it would

have been obvious to omit a prior art element when the function attributed to that element is not desired or required. 10 U.S.P.Q.2d 2031, 2032 (BPAI 1989). The court held in *In re Larson* that if a prior art element serves a particular purpose and if that particular purpose is not desired, it would have been an obvious choice to eliminate the element and its function. 144 U.S.P.Q. 347, 350 (CCPA 1965). Finally, in *In re Kuhle* the court held that if one is simplifying a prior art reference by deleting an element, and thereby deleting the element's function, it would be an obvious expedient over the prior art. 188 U.S.P.Q. 7, 9 (CCPA 1975).

In sharp contrast to the above cases, *Gunnerman absolutely requires an aqueous phase in order for its process to function as intended*, and any deletion of this element would not be a simplification or the removal of an unneeded function; in fact, the ultimate separation of the organic and aqueous phases *is the function of the Gunnerman process* and to modify the Gunnerman reference in the manner suggested by the Examiner would render Gunnerman inoperable for its intended purpose. Such proposed modifications are inappropriate for an obviousness inquiry. See *In re Gordon*, 221 U.S.P.Q. 1125, 1127 (Fed. Cir. 1984).

Accordingly, The rejection of independent Claim 40 under 35 U.S.C. § 103(a) must be reversed and the subject application remanded to the Examiner with instructions to allow Claim 40.

iv. *Appellant's Dependent Claims 41-57*

Further, Appellant submits that Claims 41-57 are allowable at least for the reason that these claims depend from an allowable base claim and recite additional features that further define the present invention.

Accordingly, Appellant respectfully requests that the Board reverse the rejection of dependent Claims 41-57 under 35 U.S.C. § 103(a) and remand the subject application to the Examiner with instructions to allow such claims.

H. The rejection of Claims 58-75 under 35 U.S.C. § 103(a) as being unpatentable over Gunnerman is in error, the rejection should be reversed, and the subject application should be remanded to the Examiner with instructions to allow Claims 58-75.

i. *The Examiner's Rejection of Independent Claim 58*

The Examiner submits in the Office Actions of August 8, 2006/September 8, 2006 that Gunnerman discloses a process for removing sulfur from a hydrocarbon feed by preheating the feed and contacting it with an oxidizing agent while exposing the feed to sonic energy and a nickel or tungsten catalyst at a residence time of from about 0.3 minutes to about 30 minutes at a temperature of from 70°C to 80°C at about atmospheric pressure. *See col. 3, lines 18-45; col. 4, lines 38-47; col. 5, line 23 through col. 6, line 37; example 1.*

However, *the Examiner concedes that Gunnerman does not disclose that the process is operated in the absence of a surface active agent.* *See Office Action p. 7.* To satisfy this feature, the Examiner speculates that at the time the invention was made it might

have been obvious to one having ordinary skill in the art to have modified the Gunnerman process by operating the process in the absence of a surface active agent *if the function of the aqueous phase is undesirable. See Office Action p. 7.*

ii. A Review of Gunnerman

Gunnerman provides a method for reducing the sulfur content of a fossil fuel by applying ultrasound to a multiphase reaction medium containing the fossil fuel along with an aqueous fluid, a hydroperoxide oxidizing agent, and a surface active agent. *See col. 2, lines 26-30.* After receiving the ultrasound treatment, the reaction medium spontaneously separates into an organic phase, now containing the desulfurized fossil fuel, and an aqueous phase, now containing the sulfur compounds. *See col. 2, lines 31-43.*

iii. Appellant's Independent Claim 58

Appellant's independent Claim 58 recites, *inter alia*, a process for *upgrading* a crude oil fraction to *improve the performance and enhance the utility* of the crude oil fraction, said process comprising...exposing said crude oil fraction to sonic energy *in the absence of a surface active agent*. The aforementioned features recited in independent Claim 58 are not taught or suggested by Gunnerman.

a. *There is no evidence supporting the motivation to modify Gunnerman to be practiced without the use of a surface active agent*

Gunnerman requires the presence of a surface active agent because the Gunnerman process effectuates the removal of sulfur by allowing the aqueous and organic phases to separate after a sonic energy treatment, wherein the aqueous phase ultimately contains the sulfur products. *See col. 2, lines 26-44.* A surface active agent is essential to Gunnerman because it allows for the formation of an emulsion between the fossil fuel and the aqueous phase, thereby enabling the oxidized sulfur to be extracted from the fossil fuel. *See col. 4, line 61 to col. 5, line 1.*

The Examiner concedes in the Office Action that Gunnerman does not disclose an operation in the absence of a surface active agent. *See p. 7.* As is well known, references can be modified for purposes of a Section 103 rejection only if there is some suggestion or incentive to do so. *In re Fritch*, 23 U.S.P.Q.2d 1780, 1783 (Fed. Cir. 1992); *M.P.E.P. § 2143.01*. Thus, some motivation would need to be shown in order to so drastically modify the Gunnerman process as to remove the essential element of having a surface active agent because, “impermissible hindsight must be avoided and the [conclusion of obviousness] must be reached on the basis of the facts gleaned from the prior art.” *In re Zurko*, 59 U.S.P.Q.2d 1693, 1697 (Fed. Cir. 2001); *See also M.P.E.P. § 2142*. The Examiner failed to identify any teaching in the prior art or any evidence whatsoever of the knowledge of one of ordinary skill in the art that would lead to this improper modification of Gunnerman. Since no evidence has been provided, the Examiner has not met his burden of establishing a *prima facie* case of obviousness.

b. *The case law cited by the Examiner does not provide the missing motivation to modify the Gunnerman reference*

In the Office Action, the Examiner relies on three cases to provide support for his improper finding of obviousness¹. These three cases are easily distinguishable from the present matter.

In sharp contrast to the above cases, *Gunnerman requires a surface active agent in order for its process to function as intended*, and any deletion of this element would not be a simplification or the removal of an unneeded function; in fact, *the ultimate separation of the organic and aqueous phases is the function of the Gunnerman process* and to modify the Gunnerman reference in the manner suggested by the Examiner would render Gunnerman inoperable for its intended purpose. Such proposed modifications are inappropriate for an obviousness inquiry. *See In re Gordon*, 221 U.S.P.Q. 1125, 1127 (Fed. Cir. 1984).

c. *There is no explanation of the motivation to modify Gunnerman to omit the use of a surface active agent*

In the Office Action, the Examiner speculates that Claim 58 would have been obvious over Gunnerman, “if the function of the aqueous phase is undesirable.” *Page 7. However, Appellant’s independent Claim 58 does not include the limitation of an aqueous phase.* The rejection is therefore nonsensical. Assuming the Examiner intended to assert an obviousness rejection if the function of a surface active agent were undesirable, that rationale is clearly without support and thus also inappropriate. As discussed above, the Examiner has

¹ For the sake of completely arguing each ground of rejection, these three cases and their holdings are discussed above in relation to the rejection of Claims 40-57, and later herein with respect to Claims 78-88.

not provided any evidence supporting the motivation to modify Gunnerman by removing the surface active agent, which is a required element for the functionality of the Gunnerman process.

As is well known, the record must point to some evidence establishing a suggestion or incentive in the prior art for making the proposed modification, without using the applicant's disclosure as the road map. *See M.P.E.P. §§ 2142, 2143.01.* Not only did the Examiner not provide any such evidence, but in this rejection there is no explanation for the motivation to modify the teachings of Gunnerman to remove the essential surface active agent from the Gunnerman process.

Accordingly, the Board must reverse the rejection of independent Claim 58 under 35 U.S.C. § 103(a) and remand the subject application to the Examiner with instructions to allow Claim 58.

iv. Appellant's Dependent Claims 59-75

Further, Appellant submits that Claims 59-75 are allowable at least for the reason that these claims depend from an allowable base claim and recite additional features that further define the present invention.

Accordingly, the Board must reverse the rejection of Claims 59-75 under 35 U.S.C. § 103(a) and remand the subject application to the Examiner with instructions to allow such claims.

I. The rejection of Claims 78-88 under 35 U.S.C. § 103(a) as being unpatentable over Gunnerman is in error, the rejection should be reversed, and the subject application should be remanded to the Examiner with instructions to allow Claims 78-88.

i. *The Examiner's Rejection of Claims 78-88*

The Examiner submits in the Office Actions of August 8, 2006/September 8, 2006 that Gunnerman discloses a process for removing sulfur from a hydrocarbon feed by preheating the feed and contacting it with an oxidizing agent while exposing the feed to sonic energy and a nickel or tungsten catalyst at a residence time of from about 0.3 minutes to about 30 minutes at a temperature of from 70°C to 80°C at about atmospheric pressure. *See col. 3, lines 18-45; col. 4, lines 38-47; col. 5, line 23 through col. 6, line 37; example 1.*

However, *the Examiner concedes that Gunnerman does not disclose that the process is operated in the absence of an oxidizing agent.* *See Office Action p. 7.* To satisfy this feature, the Examiner speculates that at the time the invention was made *it would have been obvious* to one having ordinary skill in the art to have modified the Gunnerman process by operating the process in the absence of an oxidizing agent *if the function of the aqueous phase is undesirable.* *See Office Action p. 7.*

Additionally, Applicant believes that the Examiner intended to reject Claims 76-88 under this rejection, as otherwise the Examiner would be stating that Claims 76 and 77 are patentable over Gunnerman. Accordingly, Applicant has addressed this argument as if directed toward Claims 76-88.

ii. A Review of Gunneman

Gunneman provides a method for reducing the sulfur content of a fossil fuel by applying ultrasound to a multiphase reaction medium containing the fossil fuel along with an aqueous fluid, a hydroperoxide oxidizing agent, and a surface active agent. *See col. 2, lines 26-30.* After receiving the ultrasound treatment, the reaction medium spontaneously separates into an organic phase, now containing the desulfurized fossil fuel, and an aqueous phase, now containing the sulfur compounds. *See col. 2, lines 31-43.*

iii. Appellant's Claims 76-88

Appellant's independent Claim 76 recites, *inter alia*, a process for *upgrading* a crude oil fraction to *improve the performance and enhance the utility* of the crude oil fraction, said process comprising...in the absence of an oxidizing agent...exposing said crude oil fraction to sonic energy. The aforementioned features recited in independent Claim 76 are clearly not taught or suggested by Gunneman, and are in fact opposite to those teachings. Accordingly, Appellant's Claims 77-88 which depend on Claim 76 are likewise not taught or suggested by Gunneman.

a. *There is no evidence supporting the motivation to modify Gunneman to omit the use of an oxidizing agent*

Gunneman requires the presence of an oxidizing agent because the Gunneman process effectuates the removal of sulfur by oxidizing the sulfides present in the fossil fuel to sulfones which have greater solubility in the aqueous phase. *See col. 3, lines 1-5; col. 5,*

lines 41-46. In no way does the Gunnerman reference give any indication that the process could be modified by removing the hydroperoxide oxidizing agent and still be functional.

In fact, the Examiner expressly concedes in the Office Action that Gunnerman does not disclose an operation in the absence of an oxidizing agent. See Office Action p. 7. As is well known, references can be modified for purposes of a Section 103 rejection only if there is some suggestion or incentive to do so. *In re Fritch*, 23 U.S.P.Q.2d 1780, 1783 (Fed. Cir. 1992); *M.P.E.P. § 2143.01*. Thus, some motivation would need to be shown in order to so drastically modify the Gunnerman process as to remove the essential element of having an oxidizing agent because, “impermissible hindsight must be avoided and the [conclusion of obviousness] must be reached on the basis of the facts gleaned from the prior art.” *In re Zurko*, 59 U.S.P.Q.2d 1693, 1697 (Fed. Cir. 2001); *See also M.P.E.P. § 2142*. The Office Action fails to identify any teaching in the prior art or any evidence of the knowledge of one of ordinary skill in the art that would lead to this improper modification of Gunnerman. Since no evidence has been provided, a *prima facie* case of obviousness has not been established.

b. *The case law cited by the Examiner does not provide the missing motivation to modify the Gunnerman reference*

In the Office Action, the Examiner relies on three cases to provide support for his improper finding of obviousness². These three cases are easily distinguishable from the present matter.

² For the sake of completely arguing each ground of rejection, these three cases and their holdings are discussed above in relation to the rejection of Claims 40-57, and again with respect to Claims 58-75.

In sharp contrast to the above cases, *Gunnerman requires an oxidizing agent in order for its process to function as intended*, and any deletion of this element would not be a simplification or the removal of an unneeded function; in fact, *the oxidation of the sulfides to sulfones so that the sulfones may be isolated in the aqueous phase is the function of the Gunnerman process* and to modify the Gunnerman reference in the manner suggested by the Examiner would render Gunnerman inoperable for its intended purpose. Such proposed modifications are inappropriate for an obviousness inquiry. *See In re Gordon*, 221 U.S.P.Q. 1125, 1127 (Fed. Cir. 1984).

c. *There is no explanation of the motivation to modify Gunnerman to omit the use of an oxidizing agent*

In the Office Action, the Examiner assumes that Claims 76-88 would have been obvious over Gunnerman, “if the function of the aqueous phase is undesirable.” *Page 7. However, Claims 78-88 do not include the limitation of an aqueous phase.* Like the rejection set forth above in relation to Claims 58-75 the rejection is nonsensical. Assuming, *arguendo*, the Examiner intended to assert an obviousness rejection if the function of an oxidizing agent were undesirable, that rationale is clearly without support and thus inappropriate. As discussed above, no evidence has been provided to support the motivation to modify Gunnerman by removing the oxidizing agent, which is a *required element* for the functionality of the Gunnerman process.

As is well known, the record must point to some evidence establishing a suggestion or incentive in the prior art for making the proposed modification, without using the applicant’s disclosure as the road map. *See M.P.E.P. §§ 2142, 2143.01.* Not only does the

record fail to provide any such evidence, but in this rejection there is further lacking any explanation for the motivation to modify the teachings of Gunnerman to remove the essential oxidizing agent from the Gunnerman process.

Accordingly, no basis for maintaining a rejection of these claims exists and the Board should reverse the rejection of Claims 78-88 under 35 U.S.C. § 103(a) and remand the subject application to the Examiner with instructions to allow such claims.

J. The rejection of Claims 76 and 83-88 under 35 U.S.C. § 102(b) as being unpatentable over (sic) Inoue is in error, the rejection should be reversed, and the subject application should be remanded to the Examiner with instructions to allow Claims 76 and 83-88.

i. *The Examiner's Rejection of Independent Claim 76*

In the Office Actions of August 8, 2006/September 8, 2006, the Examiner rejects Claims 76 and 83-88 under 35 U.S.C. § 102(b) as being unpatentable over Inoue. However, since the Examiner later contends that it would have been obvious to one having ordinary skill in the art to modify the Inoue reference in order to reach Applicant's claimed invention, Applicant believes that the Examiner intended to reject these claims under 35 U.S.C. § 103(a) and has discussed the rejection accordingly.

The Examiner submits in the Office Actions of August 8, 2006/September 8, 2006 that Inoue discloses a desulfurization process wherein a hydrocarbon feed (e.g., crude oil) is contacted with ultrasonic energy, wherein the process is operated at ambient temperature and pressure. *See col. 1, lines 27-38; col. 2, lines 20-44; col. 5, lines 5-8; Examples I-V.*

ii. A Review of Inoue

Inoue discloses a method for removing sulfur from petroleum liquids by exposing the liquids to high-energy sources without substantially heating the liquids. See col. 1, lines 51-64. Inoue discloses that sonic vibrations alone or in combination with some other high-energy source can result in the desulfurization of the petroleum liquids. See col. 2, lines 34-43. Inoue also discloses that in spite of using a high-energy discharge the liquid is only minimally heated from the process and the reaction effectively occurs at ambient temperature and pressure. See col. 2, lines 30-33.

iii. Appellant's Independent Claim 76

Appellant's independent Claim 76 recites, *inter alia*, [a] process for *upgrading* a crude oil fraction *to improve the performance and enhance the utility* of the crude oil fraction, said process comprising the step of heating said crude oil fraction ... The aforementioned features recited in independent Claim 76 are not taught or suggested by Inoue.

a. The Inoue patent does not teach heating a crude oil fraction

The rejection of independent Claim 76 as anticipated by Inoue is untenable. Independent Claim 76 specifically requires the step of heating the crude oil fraction while exposing the crude oil fraction to sonic energy. Inoue, in contrast, fails to teach heating the crude oil fraction while applying sonic energy. Inoue states that its method, “may be used to treat the sulfur-containing liquid without substantial heating thereof,” (Col. 1, lines 57-59) (emphasis added) and that, “in spite of the use of high-energy discharge, it has been found to

be possible to keep the heating of the liquid at a minimum so that the reaction effectively takes place at ambient temperature or pressure.” *Col. 2, lines 30-33* (emphasis added). In fact, the Examiner conceded that the Inoue “process is operated at ambient temperature and pressure.” *Office Action p. 8*.

As such, the Inoue reference does not teach all of the limitations present in Appellant’s independent Claim 76. As is well known, a prior art reference cannot anticipate in terms of 35 U.S.C. § 102 unless every element of the claimed invention is identically shown in a single reference. *In re Bond*, 15 U.S.P.Q. 2d, 1566, 1567 (Fed. Cir 1990); *M.P.E.P.* § 2131. Therefore, assuming the Examiner meant to reject the claims under 35 U.S.C. § 102, Appellant submits that the Examiner has failed to establish an adequate evidentiary basis to support such an anticipation rejection, and that the current rejection of independent Claim 76 is improper and should be withdrawn.

b. *The Inoue patent teaches away from heating the crude oil fraction*

Not only does the Inoue reference not teach the limitation of heating the crude oil fraction as required by Appellant’s independent Claim 76, the Inoue reference actually teaches away from heating the crude oil fraction. Inoue states that, “thermal treatments are expensive and may, if carried out extensively, severely modify the composition of the oil.” *Col. 1, lines 32-33*. Accordingly, there would be no motivation whatsoever to modify the Inoue reference to teach all of the limitations present in Appellant’s independent Claim 76. It is well known that when analyzing an invention for obviousness the prior art must be considered in its entirety, including disclosures that teach away from the claims. *M.P.E.P.*

§ 2141.02. As such, any 35 U.S.C. § 103(a) rejection of Appellant's independent Claim 76 would also be improper.

iv. Appellant's Dependent Claims 83-88

Further, Appellant submits that Claims 83-88 are allowable at least for the reason that these claims depend from an allowable base claim and recite additional features that further define the present invention.

Accordingly, Appellant respectfully requests that the Board reverse the rejection of dependent Claims 83-88 under 35 U.S.C. § 102(b) and remand the subject application to the Examiner with instructions to allow such claims.

K. The rejection of Claims 77-81 under 35 U.S.C. § 103(a) as being unpatentable over Inoue in view of Gunnerman is in error, the rejection should be reversed, and the subject application should be remanded to the Examiner with instructions to allow Claims 77-81.

i. The Examiner's Rejection of Claims 77-81

The Examiner submits in the Office Actions of August 8, 2006/September 8, 2006 that Inoue discloses a desulfurization process wherein a hydrocarbon feed (e.g., crude oil) is contacted with ultrasonic energy, wherein the process is operated at ambient temperature and pressure. *See col. 1, lines 27-38; col. 2, lines 20-44; col. 5, lines 5-8; Examples I-V.*

The Examiner further submits that Gunnerman discloses a process for removing sulfur from a hydrocarbon feed by preheating the feed and contacting it with an oxidizing

agent while exposing the feed to sonic energy and a nickel or tungsten catalyst at a residence time of from about 0.3 minutes to about 30 minutes at a temperature of from 70°C to 80°C at about atmospheric pressure. *See col. 3, lines 18-45; col. 4, lines 38-47; col. 5, line 23 through col. 6, line 37; example 1.*

However, the Examiner concedes that Inoue does not disclose crude oil fraction feeds as recited in Appellant's Claims 77-81. *See Office Action p. 8.* To satisfy this feature, the Examiner speculates that at the time the invention was made it would have been obvious to one having ordinary skill in the art to have modified the Inoue process by utilizing a feedstock as taught by Gunnerman because any sulfur containing hydrocarbon feed can be treated in the process of Inoue. *See Office Action p. 8.*

ii. A Review of Inoue

Inoue discloses a method for removing sulfur from petroleum liquids by exposing the liquids to high-energy sources without substantially heating the liquids. *See col. 1, lines 51-64.* Inoue discloses that sonic vibrations alone or in combination with some other high-energy source can result in the desulfurization of the petroleum liquids. *See col. 2, lines 34-43.* Inoue also discloses that in spite of using a high-energy discharge the liquid is only minimally heated from the process and the reaction effectively occurs at ambient temperature and pressure. *See col. 2, lines 30-33.*

iii. A Review of Gunnerman

Gunnerman provides a method for reducing the sulfur content of a fossil fuel by applying ultrasound to a multiphase reaction medium containing the fossil fuel along with an

aqueous fluid, a hydroperoxide oxidizing agent, and a surface active agent. See col. 2, lines 26-30. After receiving the ultrasound treatment, the reaction medium spontaneously separates into an organic phase, now containing the desulfurized fossil fuel, and an aqueous phase, now containing the sulfur compounds. See col. 2, lines 31-43.

iv. Appellant's Claims 77-81

Appellant's Claims 77-81 are dependent from base Claim 76 which recites, *inter alia*, a process for *upgrading* a crude oil fraction to *improve the performance and enhance the utility* of the crude oil fraction, said process comprising the step of heating said crude oil fraction in the absence of an oxidizing agent.... Appellant respectfully submits that the aforementioned features recited in independent Claim 76 are not taught or suggested by Inoue or Gunnerman. Accordingly, Appellant's Claims 77-81 which depend from Claim 76 are likewise not taught or suggested by Inoue or Gunnerman.

a. *Appellant's independent Claim 76 has been shown above to be allowable; therefore, dependent Claims 77-81 are likewise allowable*

The further rejection of Claims 77-81 under 103(a) as being unpatentable over Inoue in view of Gunnerman is improper for the reasons discussed above in relation to the Examiner's rejection of Appellant's independent Claim 76 under 35 U.S.C. § 102(b), as well as Examiner's rejection of Claims 77-81 under 35 U.S.C. § 103(a).

In particular, Claims 77-81 which depend from Claim 76 include the step of heating the crude oil fraction. Inoue clearly does not teach heating the crude oil fraction. In fact,

as discussed above, *Inoue teaches away from heating the crude oil fraction.* Furthermore, Claims 77-81 require the process to occur *in the absence of an oxidizing agent.* Gunnerman *absolutely requires the presence of a hydroperoxide oxidizing agent in order to effectuate its process.* To so modify Inoue and Gunnerman as to reach the process recited in Claims 77-81 would not only contradict their respective teachings but, in the case of Gunnerman would render it unsuitable for its intended purpose. Such proposed modifications are inappropriate for an obviousness inquiry. *See In re Gordon*, 221 U.S.P.Q. 1125, 1127 (Fed. Cir. 1984).

Accordingly, Appellant respectfully requests that the Board reverse the rejection of Claims 77-81 under 35 U.S.C. § 103(a) and remand the subject application to the Examiner with instructions to allow such Claims.

L. The rejection of Claim 82 under 35 U.S.C. § 103(a) as being unpatentable over Inoue alone or in view of Gunnerman is in error, the rejection should be reversed, and the subject application should be remanded to the Examiner with instructions to allow Claims 82.

i. *The Examiner's Rejection of Claim 82*

The Examiner submits in the Office Actions of August 8, 2006/September 8, 2006 that Inoue discloses a desulfurization process wherein a hydrocarbon feed (e.g., crude oil) is contacted with ultrasonic energy, wherein the process is operated at ambient temperature and pressure. *See col. 1, lines 27-38; col. 2, lines 20-44; col. 5, lines 5-8; Examples I-V.*

The Examiner further submits that Gunnerman discloses a process for removing sulfur from a hydrocarbon feed by preheating the feed and contacting it with an oxidizing

agent while exposing the feed to sonic energy and a nickel or tungsten catalyst at a residence time of from about 0.3 minutes to about 30 minutes at a temperature of from 70°C to 80°C at about atmospheric pressure. *See col. 3, lines 18-45; col. 4, lines 38-47; col. 5, line 23 through col. 6, line 37; example 1.*

However, the Examiner concedes that Inoue does not disclose that the process has a residence time of from one second to one minute. *See Office Action p. 9.* To satisfy this feature, the Examiner submits that at the time the invention was made it would have been obvious to one having ordinary skill in the art to have modified the Inoue process by operating the process at the claimed residence times because it would be expected that at least one sulfur would be released from the feedstock when the resident time is one minute. *See Office Action p. 9.* The Examiner submits that in the alternative, it would have been obvious to one skilled in the art at the time the invention was made to have modified the process of Inoue by operating the residence times as taught by Gunnerman because such residence times are effective in the Gunnerman process. *See Office Action p. 9.*

ii. A Review of Inoue

Inoue discloses a method for removing sulfur from petroleum liquids by exposing the liquids to high-energy sources without substantially heating the liquids. *See col. 1, lines 51-64.* Inoue discloses that sonic vibrations alone or in combination with some other high-energy source can result in the desulfurization of the petroleum liquids. *See col. 2, lines 34-43.* Inoue also discloses that in spite of using a high-energy discharge the liquid is only minimally heated from the process and the reaction effectively occurs at ambient temperature and pressure. *See col. 2, lines 30-33.*

iii. A Review of Gunnerman

Gunnerman provides a method for reducing the sulfur content of a fossil fuel by applying ultrasound to a multiphase reaction medium containing the fossil fuel along with an aqueous fluid, a hydroperoxide oxidizing agent, and a surface active agent. *See col. 2, lines 26-30.* After receiving the ultrasound treatment, the reaction medium spontaneously separates into an organic phase, now containing the desulfurized fossil fuel, and an aqueous phase, now containing the sulfur compounds. *See col. 2, lines 31-43.*

iv. Appellant's Claim 82

Appellant's Claim 82 is dependent from base Claim 76 which recites, *inter alia*, a process for *upgrading* a crude oil fraction to *improve the performance and enhance the utility* of the crude oil fraction, said process comprising the step of heating said crude oil fraction in the absence of an oxidizing agent.... The aforementioned features recited in independent Claim 76 are not taught or suggested by Inoue or Gunnerman, either alone or in combination. Accordingly, Appellant's Claim 82, which depends from Claim 76, is likewise not taught or suggested by Inoue and Gunnerman.

a. *Appellant's independent Claim 76 has been shown above to be allowable; therefore, dependent Claim 82 is likewise allowable*

The further rejection of Claim 82 under 103(a) as being unpatentable over Inoue alone or in view of Gunnerman is improper for the reasons discussed above in relation to the Examiner's rejection of Appellant's Claims 77-81 under 35 U.S.C. § 103(a).

Claim 82, which depends from Claim 76, includes the step of heating the crude oil fraction. Inoue fails to teach heating the crude oil fraction. In fact, as discussed above, Inoue teaches away from heating the crude oil fraction. Furthermore, Claim 82 requires the process to occur in the absence of an oxidizing agent. Gunnerman absolutely requires the presence of a hydroperoxide oxidizing agent in order to effectuate its process. To so modify Inoue and Gunnerman as to reach the process recited in Claim 82 would not only contradict their respective teachings but, in the case of Gunnerman would render it unsuitable for its intended purpose. As repeatedly discussed above, such proposed modifications are inappropriate for an obviousness inquiry. *See In re Gordon*, 221 U.S.P.Q. 1125, 1127 (Fed. Cir. 1984).

Accordingly, the rejection of Claim 82 under 35 U.S.C. § 103(a) must be reversed and the subject application remanded to the Examiner with instructions to allow such Claims.

VII. CLAIMS APPENDIX

40. A process for upgrading a crude oil fraction to improve the performance and enhance the utility of the crude oil fraction, said process comprising the step of heating said crude oil fraction in the presence of an oxidizing agent while exposing said crude oil fraction to sonic energy in the absence of an aqueous phase.

41. The process of Claim 40 wherein said oxidizing agent is hydrogen peroxide or a hydroperoxide.

42. The process of Claim 40 wherein said crude oil fraction is a fraction boiling within the diesel range.

43. The process of Claim 42 wherein said crude oil fraction is a member selected from the group consisting of fluid catalytic cracking (FCC) cycle oil fractions, coker distillate fractions, straight run diesel fractions, and blends thereof.

44. The process of Claim 40 wherein said crude oil fraction is a fraction boiling within the gas oil range.

45. The process of Claim 44 wherein said crude oil fraction is a member selected from the group consisting of FCC cycle oil, FCC slurry oil, light gas oil, heavy gas oil, and coker gas oil.

46. The process of Claim 40 wherein said crude oil fraction is a member selected from the group consisting of gasoline, jet fuel, straight-run diesel, blends of straight-run diesel and FCC light cycle oil, and petroleum residuum-based fuel oils.

47. The process of Claim 40 wherein said crude oil fraction is exposed to said sonic energy from about 1 second to about 1 minute.

48. The process of Claim 41 further comprising contacting said crude oil fraction with a transition metal catalyst.

49. The process of Claim 48 wherein said transition metal catalyst is a member selected from the group consisting of metals having atomic numbers of 21 through 29, 39 through 47, 57 through 79.

50. The process of Claim 48 wherein said transition metal catalyst is a member selected from the group consisting of nickel, silver, tungsten, cobalt, molybdenum, and combinations thereof.

51. The process of Claim 48 wherein said transition metal catalyst is a member selected from the group consisting of nickel, silver, tungsten, and combinations thereof.

52. The process of Claim 40 wherein said crude oil fraction is heated to a temperature no greater than 500°C.

53. The process of Claim 40 wherein said crude oil fraction is heated to a temperature no greater than 200°C.

54. The process of Claim 40 wherein said crude oil fraction is heated to a temperature no greater than 125°C.

55. The process of Claim 40 performed at a pressure of less than 400 psia.

56. The process of Claim 40 performed at a pressure of less than 50 psia.

57. The process of Claim 40 performed at a pressure within the range of from about atmospheric pressure to about 50 psia.

58. A process for upgrading a crude oil fraction to improve the performance and enhance the utility of the crude oil fraction, said process comprising the step of heating said

crude oil fraction in the presence of an oxidizing agent while exposing said crude oil fraction to sonic energy in the absence of a surface active agent.

59. The process of Claim 58 wherein said oxidizing agent is hydrogen peroxide or a hydroperoxide.

60. The process of Claim 58 wherein said crude oil fraction is a fraction boiling within the diesel range.

61. The process of Claim 60 wherein said crude oil fraction is a member selected from the group consisting of fluid catalytic cracking (FCC) cycle oil fractions, coker distillate fractions, straight run diesel fractions, and blends thereof.

62. The process of Claim 58 wherein said crude oil fraction is a fraction boiling within the gas oil range.

63. The process of Claim 62 wherein said crude oil fraction is a member selected from the group consisting of FCC cycle oil, FCC slurry oil, light gas oil, heavy gas oil, and coker gas oil.

64. The process of Claim 58 wherein said crude oil fraction is a member selected from the group consisting of gasoline, jet fuel, straight-run diesel, blends of straight-run diesel and FCC light cycle oil, and petroleum residuum-based fuel oils.

65. The process of Claim 58 wherein said crude oil fraction is exposed to said sonic energy from about 1 second to about 1 minute.

66. The process of Claim 59 further comprising contacting said crude oil fraction with a transition metal catalyst.

67. The process of Claim 66 wherein said transition metal catalyst is a member selected from the group consisting of metals having atomic numbers of 21 through 29, 39 through 47, 57 through 79.

68. The process of Claim 66 wherein said transition metal catalyst is a member selected from the group consisting of nickel, silver, tungsten, cobalt, molybdenum, and combinations thereof.

69. The process of Claim 66 wherein said transition metal catalyst is a member selected from the group consisting of nickel, silver, tungsten, and combinations thereof.

70. The process of Claim 58 wherein said crude oil fraction is heated to a temperature no greater than 500°C.

71. The process of Claim 58 wherein said crude oil fraction is heated to a temperature no greater than 200°C.

72. The process of Claim 58 wherein said crude oil fraction is heated to a temperature no greater than 125°C.

73. The process of Claim 58 performed at a pressure of less than 400 psia.

74. The process of Claim 58 performed at a pressure of less than 50 psia.

75. The process of Claim 58 performed at a pressure within the range of from about atmospheric pressure to about 50 psia.

76. A process for upgrading a crude oil fraction to improve the performance and enhance the utility of the crude oil fraction, said process comprising the step of heating said crude oil fraction in the absence of an oxidizing agent while exposing said crude oil fraction to sonic energy.

77. The process of Claim 76 wherein said crude oil fraction is a fraction boiling within the diesel range.

78. The process of Claim 77 wherein said crude oil fraction is a member selected from the group consisting of fluid catalytic cracking (FCC) cycle oil fractions, coker distillate fractions, straight run diesel fractions, and blends thereof.

79. The process of Claim 76 wherein said crude oil fraction is a fraction boiling within the gas oil range.

80. The process of Claim 79 wherein said crude oil fraction is a member selected from the group consisting of FCC cycle oil, FCC slurry oil, light gas oil, heavy gas oil, and coker gas oil.

81. The process of Claim 76 wherein said crude oil fraction is a member selected from the group consisting of gasoline, jet fuel, straight-run diesel, blends of straight-run diesel and FCC light cycle oil, and petroleum residuum-based fuel oils.

82. The process of Claim 76 wherein said crude oil fraction is exposed to said sonic energy from about 1 second to about 1 minute.

83. The process of Claim 76 wherein said crude oil fraction is heated to a temperature no greater than 500°C.

84. The process of Claim 76 wherein said crude oil fraction is heated to a temperature no greater than 200°C.

85. The process of Claim 76 wherein said crude oil fraction is heated to a temperature no greater than 125°C.

86. The process of Claim 76 performed at a pressure of less than 400 psia.

87. The process of Claim 76 performed at a pressure of less than 50 psia.

88. The process of Claim 76 performed at a pressure within the range of from about atmospheric pressure to about 50 psia.

VIII. EVIDENCE APPENDIX

No evidence is being submitted herewith.

IX. RELATED PROCEEDINGS APPENDIX

No decisions have been rendered by a court or the Board in the related proceedings identified in Paragraph II.

XI. CONCLUSION

In view of the foregoing, the lack of enablement, indefiniteness, and double patenting rejections have been shown to be untenable. Furthermore, none of the references of record, when considered either alone or in any proper combination thereof, anticipates or renders obvious the Appellant's invention as recited in Claims 40-88. The applied references of record have been discussed and distinguished, while significant claimed features of the present invention have repeatedly been pointed out.

As such, each and every appealed claim of the present invention meets the requirements for patentability under 35 U.S.C. §§ 112, 102, and 103. Appellant therefore requests that all of the aforementioned rejections be reversed by the Board, and that the application be remanded to the Examiner for withdrawal of the rejections.

Accordingly, allowance of the present application and the above-mentioned claims therein is respectfully requested and believed to be appropriate.

Application No.: 10/644,255
Attorney Docket: CULLN-001B

If any additional fee is required, please charge Deposit Account Number 19-4330.

Respectfully submitted,

Date: 10/15/06

By:

Customer No.: 007663



Matthew A. Newboles
Registration No. 36,224
STETINA BRUNDA GARRED & BRUCKER
75 Enterprise, Suite 250
Aliso Viejo, California 92656
Telephone: (949) 855-1246
Fax: (949) 855-6371

MAN/BND/llj
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